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H. A. P. & C. W. J.

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**BULIMULUS PROTEUS Broderip AND ITS DISTRIBUTION.**

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BY W. H. DALL.

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*Bulimus proteus* was described by Broderip from Peru in 1832. It was referred by Deshayes to *B. sordidus* of Lesson, an opinion not generally adopted, and which he afterward relinquished. In 1860, Mr. J. Xantus, collecting for the Smithsonian Institution at Cape St. Lucas, obtained one adult and two young specimens of a large *Bulimulus*, which were referred to Broderip's species by Binney; an opinion which was justified by the close resemblance and small amount of material for comparison. The singularity of distribution has been commented on by every one from Binney to Crosse and Fischer in their magnificent work on the Mexican land shells, and Dr. Cooper in recent papers on Lower Californian land shells. By a recent expedition of the California Academy of Sciences to Lower California, nearly 100 specimens of the shell in question were obtained, which I examined while in California in 1892, and which are described by Dr. Cooper (Proc. Cal. Acad., 2d Ser. III, p. 211, 1892), thus for the first time giving an opportunity for careful comparison of our Californian species with that from Peru. A series kindly sent by Dr. Cooper on behalf of the Academy, together with the original specimens of Xantus and a series of fourteen specimens of the Peruvian *B. proteus*, have been critically compared, leaving no doubt, in spite of the close similarity, that the Mexican shell is distinct and must receive a name, as the synonyms are all strictly referable to the Peruvian form.

*Bulimulus* (*Scutalus*) *montezuma* Dall.

*B. (S.) proteus* Binney, L. & F. W. Shells N. Am., 1, p. 207, fig. 358, 1869; not of Broderip, P. Z. S., 1832, p. 107.

Habitat, Lower California, mostly from the mountainous region (3500 ft. alt.), Eisen, Belding and Xantus.



As Dr. Cooper observed, this species is not as "protean" as some others. It exhibits no such variations in form or color as *B. proteus*; the latter assumes almost every mutation of form, but taken on the average is less acute and has the last whorl less patulously drawn out, axially, than the *B. montezuma*. The color of *B. proteus* is variably distributed, but tends in the most strongly colored examples to be laid on in 4-6 broad, spiral bands of brown, with indistinct boundaries, separated by paler zones. In *B. montezuma* the color is seldom present, but, when it is, it is laid on in narrow, obscure zones, parallel with the incremental lines and never spirally disposed. The granulation in the Californian shell is less coarse and intense than in the Peruvian species when most developed, and the umbilicus averages much smaller in the former. All these characters are of degree rather than kind, but two features may be mentioned which appear constant and specific. In the Mexican shell the angle which the outer lip makes with the body whorl, or axial perpendicular, at its junction is invariably more acute than in *B. proteus*, which latter has the lip bent suddenly down at this point. Secondly, the larval shell or nucleus of *B. proteus* is beautifully shagreened with minute punctations or short, almost vermicular, indentations, visible plainly under a glass, and only absent when worn off by abrasion. Traces of this sculpture may always be found. In *B. montezuma* the nucleus is delicately ribbed in harmony with the incremental lines, and does not show the peculiar shagreening alluded to, a character which alone is sufficient to establish its distinctness, but the constancy of which could not be predicated from the three specimens examined by Mr. Binney.

The distribution of the species now determined by Messrs Eisen and Belding is sufficient to disprove the hypothesis of introduction by artificial means, and it is satisfactory to have our largest North American species placed upon a permanent footing.

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#### EDIBLE MOLLUSKS OF SOUTHERN CALIFORNIA.

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CAL.

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In an interesting article upon the "Edible Mollusks of Rhode Island," by Mr. Horace F. Carpenter, published in the NAUTILUS some time ago, he compares the number of marine edible mollusks of Rhode Island with those reported from San Francisco by Professor Keep.



Dall, William Healey. 1893. "Bulimulus proteus Broderip and its distribution."  
*The Nautilus* 7, 26–27.

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